

REMARKS

In the Office Action filed April 10, 2002 claims 1-12 were rejected by the Examiner. The drawings were also objected to.

Claim Rejections 35 USC §112

Claims 1-12 were rejected for using the phrase "characterized." The claims have been reworded by substituting —comprising— for "characterized by."

Claim Rejection under USC §103

Claims 1-12 were rejected under USC §103 as being unpatentable over U.S. Patent 5,613,414 to Murphy, in view of U.S. Patent 4,156,378 to Felten.

Method claims 1-5 and 12 are directed to a method where a knife assembly is first moved toward a ply stock in a manner to insert a leading edge of the blade into the ply stock at a point spaced from a first lateral edge of the ply stock in order to back cut the ply stock from the insertion point to the first lateral edge and then cut the ply stock by traversing the knife assembly to the second lateral edge.

In Murphy the heated knife contains the heating means for changing the temperature of the knife blade as it is traversed across the tread. The knife blade is carried "on a carriage which is moved across a strip of elastomeric material."

In Felten the ply material is cut by forcing a disc between the cords of the ply. In neither of these references is there a teaching or showing of inserting a blade at a point spaced from a first lateral edge of the ply stock in order to back cut the ply stock and thereby avoid damaging

and edge of the ply stock. The Examiner noted that the apparatus claimed by Felten is "capable of inserting the blade at any point on the ply stock" however, the blade is not capable of back cutting upon vertical movement of the cutter. In fact, Felten teaches away from using heated blades and slots. See Column 1, lines 12, 23.

In response to the argument that "it would be an obvious matter of design choice to make different portions of the cutting blade of whatever form or shape was desired or expedient" it is respectfully submitted that the specific blade shape of this invention is essential to operate the cutting apparatus in accordance with the unique method of this invention and therefore involves an inventive step.

The claims set forth a method and apparatus which has been found to cut ply stock without damaging the lateral edges of the material. This has been done with only one blade cutter and one cutting direction. This is a solution to a problem not shown or taught by the prior art.

In addition to the above remarks which were directed to the original amendment A, lines 27 and 28 on page 3 have been amended and the heading "Brief Descriptions of the Drawings" has been added to page 2.

Also on page 17 the page number "3" has been deleted and the amended lines 19, 20 and 21 have been written as amended.

Conclusion

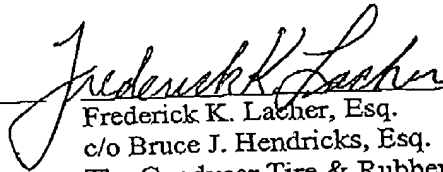
This application as amended is now believed to be in condition for allowance and such action is respectfully requested.

Respectfully submitted,

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Date

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Claims 1-12 have been amended as follows:

1. A method for cutting an associated ply stock (S) along a cut line using a cutting apparatus [10] comprising a knife assembly [14], means for moving said knife assembly [14] normally toward and away from said ply stock (S), and means for traversing said knife assembly [14] between a first lateral edge [18] and a second lateral edge [22] of said ply stock [5], said knife assembly [14] including a blade [50] having a cutting portion [54] including a leading point [66], a leading edge [58] and a trailing edge [62], said trailing edge [62] having an associated length (L), said ply stock (S) having spaced first and second lateral edges [18,22], the method [characterized by] comprising the steps of:
 - a. moving said knife assembly [14] toward said ply stock (S) to insert the leading point [66] of said knife blade [50] into said ply stock (S) at an insertion point [92] spaced a distance (D) from said first lateral edge [18] wherein distance (D) is less than or equal to length (L) in order to back-cut said ply stock (S) from said insertion point [92] to said first lateral edge [22] with said trailing edge [62] of said blade [50]; and,
 - b. traversing said knife assembly [14] across said ply stock (S) toward said second lateral edge [22] in order to cut said ply stock (S) from said insertion point [92] to said second lateral edge [22] with said leading edge [58] of said blade [50] and provide severance of said ply stock (S) from said first lateral edge [18] to said second lateral edge [22].
2. The method of claim 1 wherein the cutting apparatus [10] further includes an anvil [26] having a slot [88] in a support surface [84], said slot [88] being generally aligned with the cut line, the method further [characterized by] comprising the steps of:
 - a. inserting said leading point [66] of said knife blade [50] into said slot [88] in said anvil [26] after inserting said leading point [66] into said ply stock (S); and,
 - b. maintaining said leading point [66] within said slot [88] while said knife assembly [14] traverses said ply stock (S).

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3. The method of claim 1 wherein said cutting apparatus [10] further includes means for heating said knife blade [50], the method further [characterized by] comprising the step of:
heating said knife blade [50] before inserting said leading edge [58] into said ply stock (S).
4. The method of claim 3 further [characterized] comprising by the step of:
maintaining said heating means near said first lateral edge [18] of said ply stock (S) during the traversing of said knife assembly [14].
5. The method of claim 1 wherein said leading edge [58] of said knife blade [50] includes a concave cutting portion [120], the method further [characterized by] comprising:
engaging said concave cutting portion [120] of said leading edge [58] with said ply stock (S) after inserting said leading point [66] into said ply stock (S).
6. A knife assembly [14] for use in a cutting apparatus for cutting an associated ply stock (S) along a cut line of an anvil [26], said knife assembly [14] including a blade [50] having a cutting portion [54] including a leading point [66], a leading edge [58] and a trailing edge [62], said knife assembly [14] [characterized by] comprising:
a. said leading edge [58] of said blade [50] including a concave portion [120] adjacent said leading point [66] for urging said ply stock (S) towards said anvil [26]; and,
b. said trailing edge [62] of said blade [50] having a generally linear profile.
7. The knife assembly [14] of claim 6 wherein said knife assembly [14] [is] further [characterized by] comprises:
said leading edge [58] of said blade [50] including a convex portion [122], said convex portion [122] meeting said concave portion [120] at an inflection point [124].
8. The knife assembly of claim 6 wherein said knife assembly [14] [is] further [characterized by] comprises:

said trailing edge [62] being inclined at an angle α from 20 to 40 degrees to the plane (S-S) of the associated ply stock at the cut line.

9. A cutting apparatus [10] for cutting an associated ply stock (S) along a cut line between first [18] and second [22] lateral edges, said apparatus [10] comprising a knife assembly [14], means for moving said knife assembly [14] toward and away from said ply stock (S), and means for traversing said knife assembly [14] between said first [18] and second [22] lateral edges of said ply stock (S), said knife assembly [14] including a blade [50] having a cutting portion [54] including a leading point [66], a leading edge [58] and a trailing edge [62], said trailing edge [62] having an associated length (L), said cutting apparatus [10] [being characterized by] comprising:

said knife assembly [14] having a home position [48] wherein said leading point [66] of said blade [50] is directly above an insertion point [92] of said associated ply stock (S) and wherein a distance (D) between said first lateral edge [18] of said associated ply stock (S) and said insertion point [92] is less than or equal to said associated length (L) of said trailing edge [62].

10. The cutting apparatus [10] of claim 9 further [characterized by] comprising:
an anvil [26] positioned below said knife assembly [14] and having a slot [88] in a support surface [84], said slot [88] being generally aligned with said cut line.

11. The cutting apparatus of claim 9 further [characterized by] comprising:
means [70] for heating said knife blade [50].

12. A method of cutting a sheet of material (S) from a first lateral edge [18] to an opposite second lateral edge [22] with a knife blade [50] [characterized by] comprising:

a. plunging said knife blade [50] through said sheet (S) at a first position [92] spaced from said first edge [18],

b. continuing to plunge said knife blade [50] through said sheet (S) to cut said sheet (S) from said first position [92] to said first edge [18]; and,

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c. moving said knife blade [50] from said first position [92] to said second edge [22] to complete the cutting of said sheet from said one edge [18] to said opposite edge [22].

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

Please revise pages 1, 2, 3, and 5 of this specification as follows:

Technical Field

This invention pertains to methods and apparatus for cutting tire ply stock and the like.

Background Art

Different apparatus and methods have been utilized in order to provide cut-to-length sections of ply stock used for building tires. In U.S. Patent Nos. 3,429,490 and 3,641,855, apparatuses which utilize plunging knives are disclosed. In these apparatuses, a pair of knives is used to transpierce the ply stock at the center of the ply. Then each knife is moved to an opposite lateral edge of the ply stock. The cuts are made from the center outward in order to avoid crushing the lateral edges of the ply stock. A disadvantage of these apparatuses is that the two knives must cut between the same pair of adjacent cords.

In U.S. Patent No. 3,789,712 a single knife blade is used. The blade is moved into a first edge of the ply which is lifted from the conveyor up against a stock support and held there by the oblique cutting edge while the knife blade makes its cutting stroke. This is an attempt to cut the ply without plunging the knife or using two cutters. A disadvantage of this type of cutter is that the lateral edge of the ply stock is subjected to an inwardly directed cut and damage to the edge may occur.

U.S. Patent No. 4,156,378 discloses an apparatus which uses a circular rotatable disc cutter to engage a hard surface of an anvil and then roll on the surface to part the ply stock between a pair of cords. Again, the lateral edge is subjected to an inwardly directed cut.

The present invention provides a method and apparatus for severing ply stock between adjacent cords without the use of two separate knife blades in a way that does not damage lateral edges of the ply stock.

Disclosure of Invention

In accordance with the practice of the present invention, there is provided a new and improved method and apparatus for severing a belt package and the like to a predetermined length at a desired bias angle which employs a heated knife blade to facilitate clean cutting of the belt package between adjacent cords.

According to one aspect of the invention there is provided a method for cutting an associated ply stock along a cut line using a cutting apparatus comprising a knife assembly, means for moving the knife assembly normally toward and away from the ply stock, and means for traversing the knife assembly between a first lateral edge and a second lateral edge of the ply stock, the knife assembly including a blade having a cutting portion including a leading point, a leading edge and a trailing edge, the trailing edge having an associated length, the ply stock having spaced first and second lateral edges, the method [characterized by] comprising the steps of:

- a. moving the knife assembly toward the ply stock to insert the leading point of the knife blade into the ply stock at an insertion point spaced a distance from the first lateral edge wherein the distance is less than or equal to the associated length in order to back-cut the ply stock from the insertion point to the first lateral edge with the trailing edge of the blade; and,
- b. traversing the knife assembly across the ply stock toward the second lateral edge in order to cut the ply stock from the insertion point to the second lateral edge with the leading edge of the blade and provide severance of the ply stock from the first lateral edge to the second lateral edge.

In accordance with another aspect of the invention there is provided a knife assembly for use in a cutting apparatus for cutting an associated ply stock along a cut line of an anvil, the knife assembly including a blade having a cutting portion including a leading point, a leading edge and a trailing edge, the knife assembly [characterized by] comprising:

- a. a leading edge of the blade including a concave portion adjacent the leading point for urging the ply stock towards the anvil; and,
- b. the trailing edge of the blade having a generally linear profile.

According to a further aspect of the invention there is provided a cutting apparatus for cutting an associated ply stock along a cut line between first and second lateral edges, the apparatus comprising a knife assembly, means for moving the knife assembly toward and away from the ply stock, and wherein a distance between the first lateral edge of the associated ply stock and the insertion point is less than or equal to the associated length of the trailing edge.

One advantage of the present invention is that the ply stock can be cut between adjacent cords without severing either cord.

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Another advantage of the present invention is that the ply stock can be severed without damaging either lateral edge of the ply stock.

Still other benefits and advantages of the invention will become apparent to those skilled in the art upon a reading and understanding of the following specification.

BRIEF DESCRIPTION OF DRAWINGS:

On page 3 replace lines 27 and 28 with the following:
lateral edge 22. The apparatus 10 also includes an anvil 26 for supporting the ply stock S in the immediate area below a cut line A-A shown in Figures 3 and 8. The embodiment of apparatus 10 is shown in Figures 1 and 2,

On page 5 replace lines 19, 20, and 21 with the following:
moved away from the anvil 26 in preparation for a successive cutting operation. The knife assembly 14 is returned to a "home" position 48 as shown in Figure [3] 2 where the blade 50 is heated again before beginning the next cut.

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